

**Patent Claims**

1. Method for monitoring a reference half cell (3),  
5 wherein the reference half cell (3) forms with a measuring half cell (2) a measuring point (1) for determining and/or monitoring an ion concentration of a medium (7) and wherein the ion concentration of the medium (7) is determined on the basis of at least one  
10 measurement signal determined between the measuring half cell (2) and the reference half cell (3), characterized in that  
the measuring point (1) is intermittently operated in an operating mode and in a test mode,  
15 the ion concentration is measured in the operating mode, and  
the proper functioning of the reference half cell (3) is checked in the test mode.
- 20 2. Method as claimed in claim 1,  
characterized in that  
the noise component of the measurement signal is determined in the test mode and in the operating mode.
- 25 3. Method as claimed in claim 2,  
characterized in that  
in the test mode, an impedance is activated in the measuring circuit for the determining of the noise component, and  
30 in the operating mode, the impedance (12) is changed.
- 35 4. Method as claimed in claim 3,  
characterized in that  
for the purpose of changing the impedance (12), an impedance-changing-element (13) is activated.

5. Method as claimed in claim 3 or 4,  
characterized in that  
as impedance-changing-element (13), a switch is  
5 actuated, which is connected in parallel with the  
impedance (12) for the purpose of changing the  
impedance (12).

6. Method as claimed in claim 1, 2 or 3,  
10 characterized in that  
the noise components of the measurement signals in  
the operating mode and in the test mode are measured,  
and  
a malfunctioning of the reference half cell is  
15 recognized on the basis of the relationship of the  
changes of the noise components in the operating mode  
and in the test mode, and a corresponding report is  
output.

20 7. Method as claimed in claim 6,  
characterized in that  
the noise components of the measurement components,  
or the relationships of the changes of the noise  
components of the measurement signals in the  
25 operating mode and in the test mode are continually  
stored, and  
a report is output, concerning after which length of  
time the reference half cell (3) will probably  
exhibit a malfunction.

30 8. Apparatus for monitoring a reference half cell (3),  
wherein the reference half cell (3) forms with the  
measuring half cell (2) a measuring point (1) for  
determining and/or monitoring an ion concentration of  
35 a medium (7), and wherein a control/evaluation unit

(11) is provided, which determines the ion concentration of the medium (7) on the basis of a measurement signal determined in a measuring circuit between the measuring half cell (2) and the reference half cell (3),  
5 characterized in that the control/evaluation unit (11) operates the measuring point (1) intermittently in an operating mode and in a test mode, and  
10 the control/evaluation unit (11) determines the ion concentration of the medium (7) in the operating mode and checks the proper functioning of the reference half cell (3) in the test mode.

15 9. Apparatus as claimed in claim 8, characterized in that in the measuring circuit, an impedance (12) is provided, which is changed, preferably short-circuited, in the operating mode and is added into  
20 the measuring circuit in the test mode.

10. Apparatus as claimed in claim 9, characterized in that an impedance changing element (13) is provided, which  
25 is connected in parallel with the impedance (12), wherein the impedance changing element (13) is actuated by the evaluation/control unit (11).

30 11. Apparatus as claimed in claim 8, 9 or 10, characterized in that the control/evaluation unit (11) interprets a change of the relationship of the noise components in the operating mode and in the test mode as an indication that the reference half cell (3) is working correctly,

as soon as the change lies above a predetermined threshold value.

12. Apparatus as claimed in claim 11,  
5 characterized in that  
the control/evaluation unit (11) outputs a  
malfunctioning of the reference half cell (3), when  
the relationship of the noise components of the  
measurement signal in the operating mode and in the  
10 test mode is approximately unchanged.

13. Apparatus as claimed in claim 11 or 12,  
characterized in that  
the control/evaluation unit (11) uses statistical  
15 evaluation methods for recognizing a malfunctioning,  
or the correct working, of the reference cell (3).